DOE/EIS-0244-FS/SA2

Supplement Analysis

Increasing Batch Size for Thermal Stabilization of Plutonium Finishing Plant Metals, Oxides, and Process Residues, 200 West Area, Hanford Site, Richland, Washington

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INTRODUCTION

The U.S. Department of Energy (DOE) proposes to increase the amount of plutonium processed per batch for thermal stabilization of Plutonium Finishing Plant (PFP) Facility plutonium-bearing metals, oxides and process residues. The total amount of plutonium to be stabilized would not change; individual batch sizes would increase. The environmental impacts for stabilization activities were analyzed previously in DOE/EIS-0244-F, *Plutonium Finishing Plant Stabilization Final Environmental Impact Statement* (PFP EIS), which was issued in May 1996. Plutonium batch sizes analyzed in the PFP EIS for metals, oxides, and process residues were based on engineering judgment at the time. Potential batch sizes (based on grams of plutonium per batch) could be increased to enhance stabilization efficiency. The larger batch size would allow reduced material handling and fewer process cycles, resulting in reduced worker exposure to radiation during routine operations.

The presence of relatively large quantities of chemically reactive plutonium-bearing materials in their present form and location in DOE's PFP Facility poses unacceptable risks to workers, the public, and the environment. DOE is thermally stabilizing approximately 3,200 kilograms (7,000 pounds) of plutonium-bearing metals, oxides, and process residues presently stored at the PFP Facility, located at the Hanford Site near Richland, Washington. As stated above, the environmental impacts for stabilizing these materials were analyzed in the PFP EIS. In the Record of Decision (61 Federal Register 36352, July 10, 1996), DOE selected the "batch thermal stabilization using muffle furnaces" alternative for metals, oxides, and process residues (muffle furnace operations are conducted in gloveboxes; it was assumed that 10 muffle furnaces would be operated simultaneously). Revised (since 1996) equipment design includes larger stabilization vessels ("boats") which may be placed in muffle furnaces. DOE proposes to increase the amount of plutonium processed per batch for thermal stabilization of PFP metals, oxides and process residues from less than kilogram quantities (as described in the PFP EIS) to no more than 2.5 kilograms. Specifically, batch sizes could increase several-fold when compared to the batch sizes analyzed in the PFP EIS. These impacts remain within the current safety envelope of the PFP Facility as described in *Plutonium Finishing Plant Final Safety Analysis Report* (HNF-SD-CP-SAR-021, Rev. 1).

Section 1502.9(c) of the Council on Environmental Quality Regulation for Implementing the Procedural Provisions of NEPA, Title 40 Code of Federal Register (CFR) Parts 1500-1508, requires the preparation of a Supplemental Environmental Impact Statement (EIS) if: (1) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Section 1021.314(c) of the DOE NEPA Regulations (10 CFR 1021, 61 FR 36222, July 9, 1996) provides that, where it is unclear whether a supplemental EIS is required, DOE will prepare a Supplement Analysis to support a DOE determination with respect to the criteria of 40 CFR 1502.9(c).

The purpose of this Supplement Analysis, prepared in accordance with Section 1021.314 of the DOE NEPA regulations, is to provide a basis for a determination of whether or not a supplemental EIS is required prior to thermal stabilization of PFP metals, oxides and process residues based on an increase in plutonium batch size.

BACKGROUND

In the PFP EIS, DOE evaluated the impacts on the human environment of stabilization of residual plutonium-bearing materials to a form suitable for interim storage at the PFP Facility. For analysis purposes, the PFP reactive materials (containing a plutonium mass of approximately 3,600 kilograms [8,000 pounds]) were grouped into four inventory categories. Each category (i.e., plutonium-bearing solutions; oxides, fluorides, and process residues; metals and alloys; and polycubes and combustibles) contains materials that are chemically and physically dissimilar to materials in the other groups. Of this total material, approximately 3,200 kilograms (7,000 pounds) of plutonium-bearing metals, oxides, and process residues are to be thermally stabilized.

The stabilization, packaging, and interim storage activities would be conducted at the PFP Facility. The PFP Facility is located in the 200 West Area of the Hanford Site. The PFP Facility is approximately 11 kilometers (7 miles) from the Columbia River, the nearest natural watercourse. The nearest population center is the city of Richland, about 51 kilometers (32 miles) away.

COMPARISON OF PROPOSED ACTION TO PLUTONIUM FINISHING PLANT ENVIRONMENTAL IMPACT STATEMENT

Estimates of the potential environmental impacts associated with stabilization of the PFP Facility's plutonium-bearing metals, oxides and process residues are included in Chapter 5 of the PFP EIS ("Environmental Impacts") and are based upon the total quantity of material to be stabilized at the PFP Facility. There is no change in the total quantity of material to be stabilized and stored at the PFP Facility (i.e., the aforementioned 3,200 kilograms [7,000 pounds]). The stabilization, packaging, and interim storage activities that are described in the PFP EIS and the proposed action would be conducted at the PFP Facility. The proposed activity is not expected to impact flora, fauna, air quality, geology, hydrology/water quality, or land use plans in any substantially different manner than that previously described in the PFP EIS.

The anticipated changes from the stabilization process described and analyzed in the PFP EIS and Record of Decision are limited to potential radiological impacts, due to increased plutonium batch sizes for the thermal stabilization of PFP metals, oxides and process residues. The batch size analyzed for metals in the PFP EIS was approximately 900 grams of plutonium. Similarly, the batch size for oxides was 600 grams of plutonium, and the batch size for process residues was 240 grams of plutonium. The proposed action would increase the plutonium batch sizes to no more than 2.5 kilograms.

Routine Operations

As stated earlier, the total inventory of material to be stabilized would not change. As discussed in the PFP EIS, minimal releases to the environment of radiological constituents are anticipated due to the extensive filtration systems used at the PFP Facility. From a health effects standpoint, there would be no meaningful effect on Hanford Site workers, the public, or the environment.

Radiological impacts to PFP Facility workers for batch thermal stabilization of metals, oxides, and process residues are anticipated. However, it would be expected that increased batch sizes would reduce the number of times individual containers would be handled, and reduce the number of batches necessary to stabilize the entire inventory of material. Thus, while radiological risks would continue to be present under routine operations using an increased batch size, the risks would be less than or equal to those presented in the PFP EIS (see Table 1). No latent cancer fatalities (LCFs) would be expected as a result of the proposed action.

Table 1.
Plutonium Finishing Plant Facility Worker Health Effects, Routine Operations[1]

	PFP Facility Worker Dose	PFP Facility Worker LCF
Metals	320 person-rem	0.13
Oxides & Process Residues	640 person-rem	0.26

Accident Scenarios

Accident scenarios were analyzed in the PFP EIS for batch thermal stabilization of metals, oxides and process residues. The bounding accident scenario was postulated to be an explosion and/or fire during muffle furnace operations.[2] For any given accident scenario, an increase in the inventory of material at risk would result in a direct, linear increase in potential consequences[3]. Table 2 shows the projected impacts from accidents for batch thermal stabilization of PFP materials based on the original quantity of material at risk, as presented in the PFP EIS (Appendix D). Table 3 shows the projected impacts from accidents associated with a proposed increase in the quantity of material at risk (i.e., an increase in the inventory of plutonium in a muffle furnace up to 2.5 kilograms). These results are consistent with calculations presented in *Plutonium Finishing Plant Final Safety Analysis Report* (HNF-SD-CP-SAR-021, Rev. 1).

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[1]These data obtained from Chapter 5, PFP EIS.

[2]As stated in the PFP EIS (Section 5.1.10.2, "Accidents Associated with the Preferred Alternative"), "...The pertinent factors used to quantify the releases and health effects from a fire/explosion associated with muffle furnace operations include a total mass of material being processed at one time (one batch) of 1,200 g (2.64 lbs) (600 g [1.32 lb]) plutonium..." Appendix C of the PFP EIS provides a more detailed evaluation of potential muffle furnace accident scenarios.

[3] Appendix D (Section D.5.1) of the PFP EIS provides details on the methodology used to evaluate the health effects from an operational event during routine stabilization activities. For quantification of impacts from accidents associated with thermal stabilization of metals, oxides and process residues using a muffle furnace, the fire/explosion accident is evaluated as bounding.

Table 2.

Impacts from Accidents for Batch Thermal Stabilization of Plutonium Finishing Plant Metals, Oxides and Process Residues; Environmental Impact Statement; Original Quantity of Material at Risk[4]

PFP Materials	Doses (rem effective dose equivalent)			Latent Cancer Fatalities		
	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker
Metals	2.4×10^{-5}	8.5×10^{-6}	3.1×10^{1}	9.6×10^{-9}	4.3×10^{-9}	1.3×10^{-2}
Oxides and Process Residues	1.9×10^{-4}	6.9×10^{-5}	2.5×10^{2}	7.8×10^{-8}	3.4×10^{-8}	1.0×10^{-1}

Table 3.

Impacts from Accidents for Batch Thermal Stabilization of Plutonium Finishing Plant Metals, Oxides and Process Residues; Increased Quantity of Material at Risk[5]

PFP Materials	Doses (rem effective dose equivalent)			Latent Cancer Fatalities		
	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker[6]	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker[5]
Metals	5×10^{-5}	3×10^{-5}	1×10^{2}	3×10^{-8}	2×10^{-8}	4×10^{-2}
Oxides and Process Residues	1×10^{-3}	3×10^{-4}	1×10^{3}	4×10^{-7}	2×10^{-7}	4×10^{-1}

[4]The batch size analyzed for metals in the PFP EIS was approximately 900 grams of plutonium. The batch size for oxides was 600 grams of plutonium, and the batch size for process residues was 240 grams of plutonium. These data were taken from the PFP EIS.

[5]The proposed action would increase the batch size for plutonium in all categories of PFP materials to 2,500 grams.

[6]Potential doses to PFP Facility worker associated with oxides and process residues (i.e., 1,000 rem) have the potential to cause short-term effects (e.g., lung damage) that likely would appear long before evidence of potential cancer.

As shown in Table 3, a proposed increase in the quantity of material at risk for thermal stabilization of PFP metals, oxides and process residues would result in higher doses to workers and the general public under potential accident conditions (when compared to those doses projected in the PFP EIS [Table 2]). However, the reduced number of process cycles results in a lower probability of the postulated event occurring. Thus, the overall risk remains comparable to that presented in the PFP EIS.

DETERMINATION

The proposed action for increasing plutonium batch sizes for thermal stabilization of PFP metals, oxides, and process residues is not substantially changed in matters relevant to environmental concerns from the batch thermal stabilization process analyzed in the PFP EIS. There are no significant circumstances or new information relevant to environmental concerns associated with the proposal. Therefore, no supplemental EIS is necessary, and no additional NEPA review is required.

Signed at Richland, Washington, this 2nd day of August, 1999.

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